COOLING HELMET

This invention relates to headwear particularly suited to be worn by persons requiring headwear that will provide impact protection for the wearer.

BACKGROUND OF THE INVENTION

It has been known to use ice held close to the head of a person to provide cooling for medical purposes.

For instance, it is known to cover the head with a pliable material adapted to hold frozen liquid so that the surface of the head is kept cold. This process is used to reduce damage to hair follicles for those who might be taking cancer drugs where they might otherwise lose their hair.

In practical headwear that provides impact protection which also includes temperature modifying materials, there is one prior art example published as a mere paper publication where there is a helmet with an arrangement to support a bladder with a breakable pouch of an encapsulated ammonium salt within a body of water. The bladder is shown as fitting against an inner side of the helmet and is arranged to be held in this position by hook and loop fastener pads (often referred to by the Registered Trade Mark Velcro). Unfortunately the use of a breakable pouch within a bladder in this disclosure is used to replace soft padding and is shown so that the liquid bladder will bear directly against the head of a wearer.

This has the disadvantage that the bladder will result in heat transfer from a users head directly by conduction to the bladder and is not conducive to cooling any other areas of the head. This leads implicitly to significant temperature differences against the head and is somewhat akin to having an ice pack held against the skin where this becomes very uncomfortable after a modest period.

By replacing some of the padding the advantage is that the helmet itself is not integrally compromised but the padding is altered so that it will still need separate testing.

A further difficulty with direct contact is that the temperature modifying material will be directly contacting a head of the user with the result that any retained heat

differential will be compromised relatively quickly. In other words by having direct contact the cooling effect may for instance only last a relatively short time.

A problem to which this invention is directed is to provide an impact protective article of headwear that allows for a more comfortable arrangement where heat modifying means are involved and also to assist in increasing time that a cooling of heating effect may be sustained in a headwear item.

BRIEF DISCLOSURE OF THIS INVENTION

In one form of this invention there is proposed an article of headwear having a crown which has an outer part of crown shape, and an inner part of crown shape of a size and shape adapted to and nesting with the outer part and at least one intermediate part which is positioned to be intermediate the said outer and inner crown parts and which outer and inner parts are together adapted to support in removable fashion the intermediate part, and where the intermediate part is comprised of at least in the main of a fluid.

In preference the fluid is held in one or more pliable pouches which can be removable and replaceable with other pouches.

Preferably the fluid is a freezable gel so that there can be a plurality of such pouches which can be used to replace one another so that as one is warmed another from a freezer can replace this to maintain a preferred extent of cooling.

By structurally separating the crown of a headwear item into at least two parts with an intermediate part in between provides an opportunity to control within a contained space arrangements for airflow and cooling effect and distribution of cooling air from this.

Also where there is a lower and upper part of an impact resistant material, this then allows for improved impact resistance by reason of a double wall characteristic which can then also mean that lighter materials may be used for the individual parts which is to say lighter than would have been ordinarily needed for a single thickness crown to get a similar protective effect. This can assist in keeping an all up weight of a helmet within acceptable limits.

Preferably, there is a further part positioned between the intermediate part and the outer part which is comprised of at least in the main an insulating material.

Preferably, the inner part is an impact resistant material.

Preferably, the further part is a pliable and insulating material.

Preferably, the intermediate part includes a pliable plastics material sheet holding therewithin a freezable gel.

Preferably, there is a peak extending outwardly from the outer part of the crown from a rim of the crown shape of the outer part.

In a further form of the invention, the inner part is a cradle or harness having a lower rim interengaging with the outer part and supporting at least one strap extending from one side of the rim portion to an opposite side of the rim portion and following the path defining a crown shape nesting within the outer part.

Preferably, the impact resistant material is a plastics material.

Preferably, the impact resistant material is a poly-carbonate plastics material.

Preferably, the impact resistant material is a glass fibre-reinforced polyester plastics material.

Preferably, the hat further includes a protective face frame.

Preferably, there is extending over the outer part a woven fabric..

In the alternative it is a stretch fabric..

Preferably, the outer part and the inner part are held together by a central joining member.

Preferably, the inner part has a portion which is bulbous and is centrally located and the intermediate part has a central aperture through which the bulbous portion of the inner part extends.

For a better understanding of this invention it will now be described with relation to one embodiment which shall now be described with the assistance of drawings wherein:

Figure 1 is an exploded perspective view of a first embodiment,

Figure 2 is a cross-sectional view of the embodiment shown in Figure 1,

Figure 3 is an exploded perspective view of a second embodiment,

Figure 4 is a cross-sectional view of the embodiment shown in Figure 3,

Figure 5 is an exploded perspective view of a third embodiment,

Figure 6 is a cross-sectional view of the embodiment shown in Figure 5.

DETAILED DESCRIPTION OF THE INVENTION

Now referring to the drawings, and to Figure 1 in particular, this illustrates an impact protective helmet of a type intended to be worn by a person batting in the traditional game of cricket.

Accordingly, the helmet 1 has an inner part 2 of crown shape which is moulded from an impact resistant plastics material this being glass fibre reinforced polyester in this case. This provides for further parts including a brim 19 and sides to be joined from two parts as a part of the lower part 2.

There is provided an outer part 6 of crown shape which is of a dome shape and which arranged to generally have an outer lower edge which conforms to a periphery 7 of the lower part 2 so as to define a cavity 8 between the two.

This cavity 8 is shaped so as to receive within it a pack 9 which is provided by two sheets of pliable plastic material welded together along inner and outer seems 10 and 11 so as to define a pouch 12 with a central hole 13 passing through it.

Within the pouch 12 there is a freezing gel which is adapted to be frozen at colder temperatures typically zero degrees centigrade or below and which will therefore

once frozen, be available to melt and provide thereby cooling effect.

The upper part 6 is held in position by a bolt 15 embedded within the lower part 2 at a central location and projects upwardly so as to pass through aperture 16 and to be held in position by nut 17.

Apertures 18 are positioned in distributed fashion in the inner part 2 so as to allow for air flow from the frozen gel into an air space beneath the inner part 2.

A brim 19 projects forwardly from the inner part 2 and there is a strap 19a to hold the helmet onto the head of a user.

What is not shown specifically however but which is included as is traditionally used is the means to support the helmet on the head namely in one case a set of straps which go from side to side and therefore pass over a top of the head of the user and hold the lower surface of the helmet namely the inner part significantly above the head or hair or skin of the user. In another case discrete blocks of padding 21 are placed around a periphery on the inside of the inner part 2 these being spaced apart to allow for air to access and flow to the surface of the head of the user in each case.

In practice, this arrangement then provides for a very convenient facility in which the upperpart 6 will fit with the lower shell or crown shape of the lower part 2 so that the outermost shape will look to be very similar to a conventional helmet shape.

The pack 9 can be removed from time to time by simply undoing the nut 17 and lifting the upper part away and replacing the pack with a further frozen pack so that a person wearing the hat may be able to be kept cool over periods of typically an hour or so according to tests thus far conducted.

As can now be seen the arrangement provides herein a double wall of an upper and lower part which implicitly results in a protection which is more likely to provide better protection than a single wall arrangement with a similar wall thickness and type of plastics material. Also by having a freezing gel held within a structurally self supporting arrangement means that normal protective features of this type of helmet can be maintained for instance the structure of the helmet can be supported by the conventional discrete padding or by strapping and there is no

direct engagement needed of the freezing pouch against the head or skin of the user.

Various other users require participants to wear protective headwear which also have a potential problem when it is hot. These include, amongst others, those participating in cycling, baseball, lacrosse and American football.

In each case, specialized helmets have been developed according to the requirements of each of these uses. It will be understood by persons skilled in the relevant art that it would be a relatively straightforward matter to adapt the arrangement outlined above to each of these differing helmet arrangements.

Referring now to Figures 3 and 4, this illustrates a helmet of the type intended to be worn by a construction worker working on a building site which are often referred to as a hard hat.

The helmet 20 has an outermost shell which forms there by an outer part 22 which is moulded from an appropriate impact resistant plastics material as per a conventional construction helmet such as a polycarbonate plastics material.

There is also provided an insulating material 24 which is of a dome shape, and which is adapted to generally conform to the periphery 26 of an inner part 28 so as to define a cavity 30 between the two which is to say the outer part 22 and the inner part 28 both of which are of dome shape and which provide for the inner part 28 to nest within the outer part 22.

This cavity 30 is adapted to receive within it a pack 32 which contains a freezable gel, which is provided by two sheets of pliable plastic material welded together along inner and outer seams 34 and 36 so as to define a pouch 38.

Within the pouch 38 there is the freezing gel which is adapted to be frozen at colder temperatures of typically zero degrees centigrade or below, and which will therefore once frozen, melt and provide thereby cooling effect.

The insulating material 24 and innerpart 28 are held together, and then collectively secured to the outermost shell , via the helmet webbing 40 (represented by the dashed lines), which is of a type conventionally found in such construction helmets, which in this case as is conventional is removably attached to the outermost shell

via means of clips 42 adapted to engage the outermost shell 22.

The brim 43 is in this case now a part of the outer part 22 which provides for the inner part to in this case fit or nest within the outer part 22.

Such an arrangement of helmet webbing is removable therefore relatively easily, in order to facilitate replacement of the pouch 38 once for instance it is no longer frozen with a further frozen pack as before.

Once again therefore it will be seen that the cooling materials are arranged to be held above and out of direct contact with the head or skin of a user and this then allows for air to circulate and also for better insulation and control of air flow past the frozen materials to be achieved.

A further advantage of this arrangement is that it allows for a conventional hard hat of a type which is already being manufactured in large numbers and economically to be relatively simply modified to allow for cooling to be available. This is considered to be of great advantage especially where those who are constrained to work outside may not continue work in higher temperatures but may now be persuaded to continue to work for longer periods in higher temperatures.

As hard hats are compulsory on a number of factory, building and construction sites and their design has been the subject of significant development the advantage therefore of a simple adaption will be readily appreciated to allow for cooling.

Various other occupations require protective headwear. These include, amongst others, firefighters and welders. In each case, specialized helmets have been developed according to the exact requirements of each of these occupations. It would be easily understood by a person skilled in the art that it would be a relatively straightforward matter to adapt the arrangement outlined above to each of these differing helmet arrangements.

Referring now to Figures 5 and 6, these illustrate a hat 50 made primarily of a cloth material of the type commonly referred to as a baseball cap. In this case the cap includes gores 51 which define a crown 52 and there is a peak 53 projecting from one side of the periphery of the crown. Further however this cap uses a multi size fit design in which the gores 51 are a spandex material which allows for the

crown to expand to allow for different head sizes to be fitted comfortably and there is also an elastic inner sleeve 53a which in one case which is not specifically shown is surrounded by a toweling sleeve. This allows for further comfortable expansion.

Inside the crown there is now provided an outer part 54 made from an appropriate impact resistant plastics material in a dome shape, and which is adapted to generally conform to the periphery 56 of an inner part 58 so as to define a cavity 60 between the two where the inner part 58 nests therefore with the outer part 54. These parts 54 and 58 are held in place simply by friction between the expandable crown material and the outer edges of the respective parts.

This cavity 60 is arranged to receive within it a pack 62 as before, which is provided by two sheets of pliable plastic material welded together along inner and outer seems 64 and 66 so as to define a pouch 68.

Within the pouch 68 there is a freezing gel which is adapted to be frozen at colder temperatures typically 0 degrees centigrade or below and which will therefore once frozen, melt and provide thereby cooling effect.

The shells 54 and 58 are held together as stated and then collectively secured to the hat, by a screw 70 with a button 76 of the type commonly found on the crown of such caps for a head, adapted to be received within the lowermost shell at a central location.

Such an arrangement allows for the pouch 68 to be removable therefore, in order to facilitate replacement of a further frozen pouch 68.

This design allows for applications such as golf to be accommodated with some impact protection from golf balls as well as cooling. In this design this allows for the elastic sleeve to engage arrange a head of a user so that the cron itself stands proud of the actual top of the head. In practise this means that there is again an air space and even with the several parts and a gel pouch there is still left room for and air space above the head of a wearer and the inner part lower surface.

In each case embodiment the design has been provided with an inner part and an outer part and in each case there are apertures to be provided through the parts

which have not been shown specifically but which will be able to be placed in position and be judged as to size and location to best balance the need for maintaining of insulation as compared to allowing for a cooling effect with air passage.

There are other styles of articles of headwear. It will be easily understood by a person skilled in the art that it would be a relatively straight forward matter to adapt the arrangement and principals outlined above to each of other styles.

Articles such as those described herein have now proven themselves to be of considerable benefit both for comfort for users while maintaining and probably improving safety and convenience to those who must use hats and hard caps for protective purposes, especially where being subjected to higher temperature working conditions.

Results of testing of helmets made in accordance with this invention have shown that very substantial benefits can be obtained from this b y for instance keeping the temperature above the head of a user In a cool state over a longer period without undue disadvantage.

Here are some examples of test results for the helmet generally shown as the second embodiment.

Example 1

Temperature in the shade 29deg.cel. Direct sunlight temp. 37.5 Deg. C. The gel pack is placed in position in a frozen state.

Constant temperature reading inside helmet after 30min. 20.5 Deg.C.

50min. 21.5 Deg.C.

80min. 22. Deg.C.

Based on 5 overs being bowled in 20mins, equates to Replacement for Cricketers at Drinks Break(20 overs)Average drinks break per match is 17- 20 overs.

Example 2

Temp. in shade 39 Deg.C. Direct Sunlight 47.5Deg.C. Gel pack started in the frozen state

Temperature in helmet after39min.24.Deg.C

after 70min.25Deg.C

after 75min.26Deg.C

Example 3

Test under Cricket Match conditions

Temp. In shade was 36Deg. Gel pack lasted 75 Mins . and changed at drinks.

Packs Temp in helmet was 20deg at start of play and 29deg. at the finish.

Humidity was 86% (it was a Muggy day).

Based on Medical Doctors statements a best temp range is between 18-22Deg.C. for the human brain to function best.

Example 4

Tests on Equestrian Helmet at Darwin In 34 Deg Temp .shade. Direct sunlight temp.42.5Deg.

3 hr cross Country Ride resulted inside helmet pack Temp 29DegC at end.

Example 5

Temperature Tests Done on Cricket helmet without Cooling were

Temp. 28 Deg.C.in the shade and 36.5Deg.C. Direct sunlight

Results inside helmet 16min. = 36 Deg.C.

30min = 39Deg.C.

These results illustrate the advantage of the invention.